

1,2-Propyleneimine (2-Methyl Aziridine)

75-55-8

Hazard Summary

1,2-Propyleneimine is used as an intermediate in the paper, textile, rubber, and pharmaceutical industries. 1,2-Propyleneimine is severely irritating to the eyes and upper respiratory tract from acute (short-term) inhalation exposure in humans. Headaches, dizziness, nausea, bronchitis, shortness of breath, and edema of the lungs have also been reported in humans. No information is available on the chronic (long-term), reproductive, developmental, or carcinogenic effects of 1,2-propyleneimine in humans. Animal studies have reported effects on the kidneys, blood, and gastrointestinal system from chronic inhalation and oral exposure to 1,2-propyleneimine. Animal studies have reported tumors of the mammary glands and intestines, leukemia, and other tumor types from oral exposure to 1,2-propyleneimine. The International Agency for Research on Cancer (IARC) has classified 1,2-propyleneimine as a Group 2B, possible human carcinogen. EPA has not classified 1,2-propyleneimine for carcinogenicity.

Please Note: The main source of information for this fact sheet is the Hazardous Substances Data Bank (HSDB) (1), a database of summaries of peer-reviewed literature. Other secondary sources include the IARC monographs on chemicals carcinogenic to humans (4) and the Registry of Toxic Effects of Chemical Substances (RTECS), a database of toxic effects that are not peer reviewed.(2)

Uses

- 1,2-Propyleneimine is used as an intermediate in the paper, textile, rubber, and pharmaceutical industries. Its main use is to improve the adhesion of latex surface-coating resins. (6)

Sources and Potential Exposure

- Occupational exposure to 1,2-propyleneimine may occur for a small number of workers in the paint and chemical industries. (1)

Assessing Personal Exposure

- No information is available on the assessment of personal exposure to 1,2-propyleneimine.

Health Hazard Information

Acute Effects:

- 1,2-Propyleneimine is severely irritating to the eyes and upper respiratory tract from acute inhalation exposure in humans. Headaches, dizziness, nausea, bronchitis, shortness of breath, and edema of the lung have also been reported. (1)
- Dermal exposure to 1,2-propyleneimine in humans results in skin irritation. (1)
- Tests involving acute exposure of rats have shown 1,2-propyleneimine to have **extreme** acute toxicity from oral and dermal exposure. (2)

Chronic Effects (Noncancer):

- No information is available on the chronic effects of 1,2-propyleneimine in humans.

- Animal studies have reported effects on the kidneys, blood, and gastrointestinal system from inhalation and oral exposure to 1,2-propyleneimine. (1)
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for 1,2-propyleneimine.(3)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of 1,2-propyleneimine in humans or animals.

Cancer Risk:

- No information is available on the carcinogenic effects of 1,2-propyleneimine in humans.
- Animal studies have reported tumors of the mammary glands, intestine, and ear canal and leukemia from oral exposure of rats to 1,2-propyleneimine. (1,4,5,6)
- IARC has classified 1,2-propyleneimine as a Group 2B, possible human carcinogen. (4)
- EPA has not classified 1,2-propyleneimine for carcinogenicity. (3)

Physical Properties

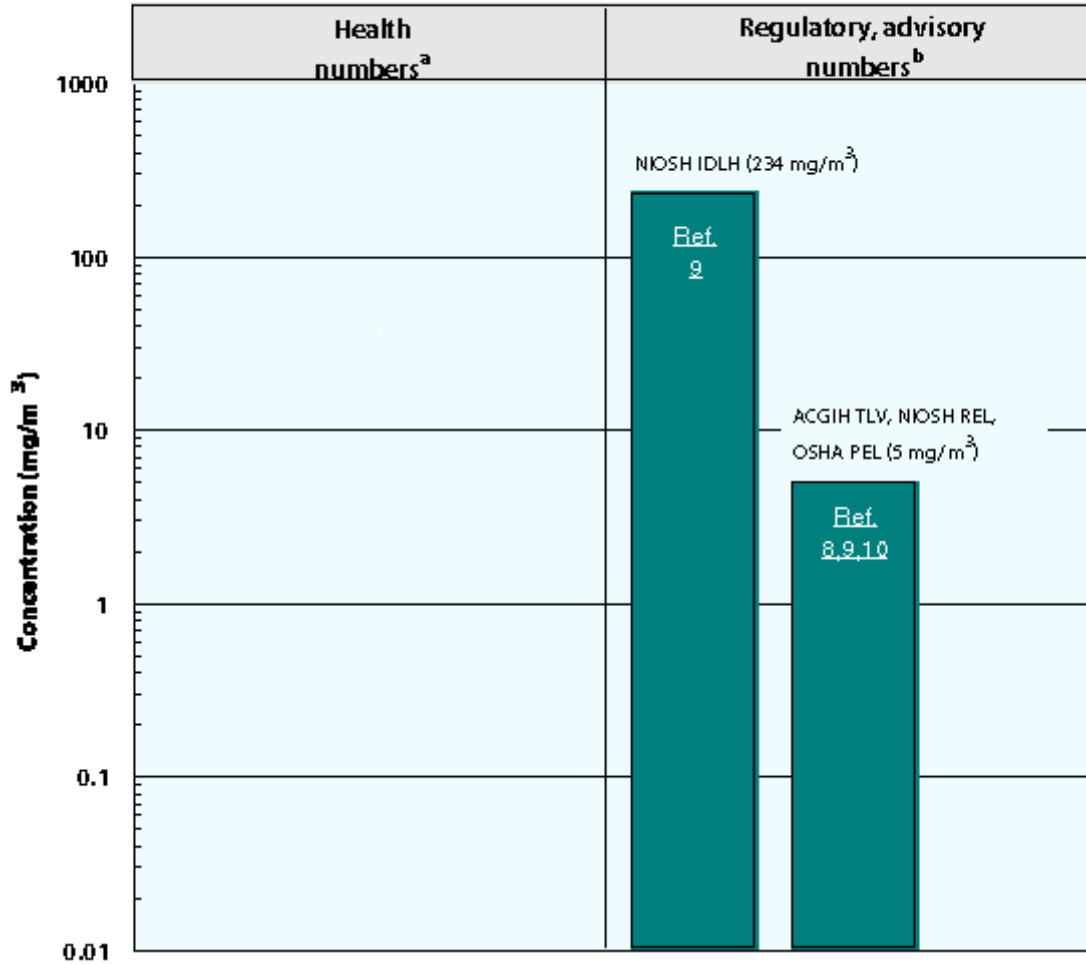
- 1,2-Propyleneimine is a fuming, colorless, oily liquid with a strong, ammonia-like odor. (6,7)
- The chemical formula for 1,2-propyleneimine is C_3H_7N , and the molecular weight is 57.11 g/mol. (1,6)
- The vapor pressure for 1,2-propyleneimine is 112 mm Hg at 20 °C. (1)

Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : $mg/m^3 = (ppm) \times (\text{molecular weight of the compound}) / (24.45)$. For 1,2-propyleneimine: $1 \text{ ppm} = 2.3 \text{ mg/m}^3$.

Health Data from Inhalation Exposure

1,2-Propyleneimine



ACGIH TLV --American Conference of Governmental and Industrial Hygienists' threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.

NIOSH REL --National Institute of Occupational Safety and Health's recommended exposure limit; NIOSH-recommended exposure limit for an 8- or 10-h time-weighted-average exposure and/or ceiling.

NIOSH IDLH -- NIOSH's immediately dangerous to life or health concentration; NIOSH recommended exposure limit to ensure that a worker can escape from an exposure condition that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from the environment.

OSHA PEL --Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

The health and regulatory values cited in this factsheet were obtained in December 1999.

^a Health numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.

^b Regulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice. OSHA numbers are regulatory, whereas NIOSH and ACGIH numbers are advisory.

Summary created in April 1992, updated January 2000

References

1. U.S. Department of Health and Human Services. Hazardous Substances Data Bank (HSDB, online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.
2. U.S. Department of Health and Human Services. Registry of Toxic Effects of Chemical Substances (RTECS, online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.
3. U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS) on 1,2-Propyleneimine. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.
4. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Supplement 7. World Health Organization, Lyon. 1986.
5. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Volume 9. World Health Organization, Lyon. 1975.
6. U.S. Department of Health and Human Services (DHHS). The 8th Report on Carcinogens. 1998 Summary. Public Health Service, National Toxicology Program. Research Triangle Park, NC. 1998.
7. New Jersey Department of Health. Hazardous Substance Fact Sheet on 1,2-Propyleneimine. New Jersey Department of Health, Trenton, NJ. 1986.
8. American Conference of Governmental Industrial Hygienists (ACGIH). 1999 TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents. Biological Exposure Indices. Cincinnati, OH. 1999.
9. National Institute for Occupational Safety and Health (NIOSH). Pocket Guide to Chemical Hazards. U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention. Cincinnati, OH. 1997.
10. Occupational Safety and Health Administration (OSHA). Occupational Safety and Health Standards, Toxic and Hazardous Substances. Code of Federal Regulations 29 CFR 1910.1000. 1998.